Section I: AQMD BACT Determinations

Application No.: 371781

Equipment Category – CO2 Plant

1. GENERAL INFORMATION

DATE: 12/29/2005

A. MANUFACTURER: Toromont Process Systems

B. TYPE: <<<Refrigerated condensation and distillation>>>

C. MODEL:

D. STYLE:

E. APPLICABLE AQMD RULES: Reg. X (NESHAPS), Reg. XIII, <<<Rule 1415 (Stationary Refrigeration and Air Conditioning Systems)>>>

F. COST: $8 million (1999) SOURCE OF COST DATA: Owner/Operator

G. OPERATING SCHEDULE: 24 HRS/DAY 7 DAYS/WK 52 WKS/YR

2. EQUIPMENT INFORMATION

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A. FUNCTION: Produces liquid CO2

B. SIZE/DIMENSION/CAPACITY:

C. BLOWERS:

D. TOTAL FLOW RATE: 9300 scfm

E. MATERIAL STORED/PROCESSED/HANDLED: Processes CO2-rich vent gas from steam-hydrocarbon reformer located in Chevron refinery.

F. THROUGHPUT/PROCESS RATE/USAGE RATE: Produces up to 600 tpd liquid CO2

3. COMPANY INFORMATION

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A. NAME: BOC Group, Inc.

B. SIC CODE: 2813

C. ADDRESS: 890 E. El Segundo Blvd.
CITY: El Segundo STATE: CA ZIP: 90245

D. CONTACT PERSON: <<<Roger Han>>>

E. PHONE NO.: 310-533-8394 x16

4. PERMIT INFORMATION

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A. AGENCY: SCAQMD

B. APPLICATION TYPE: new construction

C. AGENCY CONTACT PERSON: Pablo Pua

D. PHONE NO.: 909-396-2597

E. PERMIT TO CONSTRUCT/OPERATE INFORMATION: P/C NO.: 371781 ISSUANCE DATE: 7/28/2000
☐ CHECK IF NO P/C P/O NO.: <<<F42182 ISSUANCE DATE: 7/25/2001>>

F. START-UP DATE: August 2000

5. EMISSION INFORMATION

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A. PERMIT

A1. PERMIT LIMIT: Non-methane, non-ethane hydrocarbons control efficiency 95% or 25 ppm as methane. CO limit 10 ppm. Oxidizer chamber temperature at or above 1500F.

5. EMISSION INFORMATION

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A2. BACT/LAER DETERMINATION: Control efficiency and emission limits in 5A1.

A3. BASIS OF THE BACT DETERMINATION: Technology transfer from spray booths

B. CONTROL TECHNOLOGY

B1. MANUFACTURER/SUPPLIER: Adwest Technologies

B2. TYPE: Regenerative Thermal Oxidizer (RTO), model No. RETOX 1.5 RTO 95

B3. DESCRIPTION: The RTO, rated at 1.05 MMBtu/hr input and with 10 hp blower, consists of two reinforced, insulated chambers filled with ceramic heat exchanging media to recover waste heat by regenerative heat transfer. The gas flow is automatically controlled by zero leakage poppet valves, which change the direction of the gas flow at regular intervals via a programmable logic control system. The burner is primarily used for cold startups, typically one hour, using natural gas or propane. Due to the high level of combustible hydrocarbons (mostly methane and ethane) in the exhaust stream, the oxidizer will operate after startup at 1700 to 1800 degrees F without additional fuel. The hot exhaust gas passes through and heats one bed filled with ceramic heat transfer media. Simultaneously the HC-laden process air enters the other bed and is heated by the ceramic heat transfer media that has been previously heated by the hot exhaust. The gas flows are periodically switched between the two beds to provide optimum heat recovery. NOx emissions are expected to not exceed 5 ppmv.

B4. CONTROL EQUIPMENT PERMIT APPLICATION DATA: P/C NO.: 371432 ISSUANCE DATE: 7/28/2000
P/O NO.: <<<F42181 ISSUANCE DATE: 7/25/2001

B5. WASTE AIR FLOW TO CONTROL EQUIPMENT: FLOW RATE: 925 scfm
ACTUAL CONTAMINANT LOADING: 39 lb/day NMNEHC BLOWER HP: 6.8

B6. WARRANTY: 95% THC reduction or 25 ppm as methane, 10 ppm CO, 5 ppm NOx

B7. PRIMARY POLLUTANTS: VOC

B8. SECONDARY POLLUTANTS: NOx

B9. SPACE REQUIREMENT: 10'-2" L x 7'-11" W x 7'-3" H

B10. LIMITATIONS: If used to control chlorinated hydrocarbons, RTOs should be designed with corrosion-resistant materials.

B11. UNUSED

B12. OPERATING HISTORY: <<<Has operated almost steadily since startup whenever the refinery operates.>>>

B13. UNUSED

B14. UNUSED

C. CONTROL EQUIPMENT COSTS

C1. CAPITAL COST: ☐ CHECK IF INSTALLATION COST IS INCLUDED IN CAPITAL COST
EQUIPMENT: $116,525 INSTALLATION: $18,535 (2000) SOURCE OF COST DATA: Manufacturer

C2. ANNUAL OPERATING COST: $3,592 (2000) SOURCE OF COST DATA: Manufacturer

D. DEMONSTRATION OF COMPLIANCE

D1. STAFF PERMFORMING FIELD EVALUATION:
ENGINEER'S NAME: INSPECTOR'S NAME: <<<Ash Nikravan, Harold Rank>>>
DATE: <<<7/10/03 and 8/25/05, resp.>>>

5. EMISSION INFORMATION

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D2. COMPLIANCE DEMONSTRATION: <<<Equipment well maintained and being operated in compliance with permit conditions.>>>

D3. VARIANCE: NO. OF VARIANCES: <<<None>>> DATES:

CAUSES:

D4. VIOLATION: NO. OF VIOLATIONS: <<<1>>> DATES: <<<11/9/2001>>>

CAUSES: <<<Not recording RTO chamber temperature>>>

D5. MAINTENANCE REQUIREMENTS:

D6. UNUSED

D7. SOURCE TEST/PERFORMANCE DATA RESULTS AND ANALYSIS:

DATE OF SOURCE TEST: <<<11/30/2000>>> CAPTURE EFFICIENCY:

DESTRUCTION EFFICIENCY: OVERALL EFFICIENCY:

SOURCE TEST/PERFORMANCE DATA:

<<<

Production Rate, tpd 550

RTO Chamber Temp., F 1711

	Inlet	Outlet
Flow Rate, dscfm	424	1420
Temperature, F	114	202
O2, %	0.2	14.8
CO2, %	98.9	26.3
CO, ppmv	18.2	<6
NMHC, ppmv	35.2	<10
NMHC, lb/hr as CH4	0.284	<0.27 >>>

OPERATING CONDITIONS: <<<Both the dryer and the carbon bed units were undergoing regeneration during test--carbon bed being heated, dryer being cooled.

TEST METHODS: One-hour test. CO by AQMD Method 100.1, NMHC by AQMD Method 25.1 at inlet and 25.3 at outlet.>>>

6. COMMENTS

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BACT had not previously been determined for a CO2 plant. This BACT determination was subject to public review (30-day notice issued 7/13/2000).

<<<There are three vent streams: drier regen vent, carbon bed regen vent and condenser vent. The initial BACT determination was that all three vents should pass through an RTO. The applicant appealed with regard to the condenser vent on the basis that some spray booths had been permitted without add-on control while venting more VOC than that contained in the condenser vent. AQMD therefore relieved them of the requirement to vent the condenser to the RTO.

They are required (permit condition) to monitor and record RTO chamber temperature. Under our Rule 1415, they are required to perform tests and keep records regarding the refrigeration system including an annual leak test, records of repairs performed pursuant to the leak test results, an operating log showing all malfunctions and a log of all refrigerant additions to the system.

All pumps and compressors are electric.>>>